

IN THE CLAIMS

Please cancel claims 1 - 14, 16, 17, 24

Please enter the following amended claims. Marked-up versions of these claims can be found at the end of this response.

- Handwritten: A2*
15. An apparatus for atomizing a fluid comprising:
- (a) a central passageway for allowing a fluid to be atomized to pass therethrough;
 - (b) an atomization zone positioned downstream from and in fluid communication with, said central passageway;
 - (c) and a plurality of atomization fluid passageways configured to fluidly communicate with the central passageway via atomization fluid passageway outlets, wherein the atomization fluid passageway outlets have a forward acute angle greater than 60° and are positioned concentrically about a perimeter of the central passageway; and
 - (d) a heating zone configured to promote heat exchange between the central passageway and the plurality of atomization fluid passageways, wherein the heating zone is positioned upstream from the atomization zone; and
 - (e) a mixing zone comprising a first inlet for a fluid to be atomized and a second inlet positioned upstream of said central passageway from said atomizing fluid passageway outlets, which second inlet is a sparger which is comprised of a cylindrical conduit containing a plurality of sparger fluid passageways to allow the passage of sparger fluid into said mixing zone, and which mixing zone is in fluid communication with said central passageway.

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20. An apparatus for atomizing a fluid comprising:
- (a) a central passageway for allowing a fluid to be atomized to pass therethrough;

- B3
- (b) an atomization zone positioned downstream from and in fluid communication with, said central passageway;
 - (c) a plurality of atomization fluid passageways configured to fluidly communicate with the central passageway via atomization fluid passageway outlets, wherein the atomization fluid passageway outlets have a forward acute angle greater than 60° and are positioned concentrically about a perimeter of the central passageway; and
 - (d) a heating zone configured to promote heat exchange between the central passageway and the plurality of atomization fluid passageways, wherein the heating zone is positioned upstream from the atomization zone; and
 - (e) a steam splitter positioned within the central passageway upstream from the atomization fluid passageway outlets, and
 - (f) a mixing zone comprising a first inlet for a fluid to be atomized and a second inlet positioned upstream of said central passageway from said atomizing fluid passageway outlets, which second inlet is a sparger which is comprised of a cylindrical conduit containing a plurality of sparger fluid passageways to allow the passage of sparger fluid into said mixing zone, and which mixing zone is fluid communication with said central passageway; and

wherein the central passageway has a cross-section comprising two-dimensions, wherein as at least one of the two dimensions converges in a downstream direction along at least a portion of the length of the central passageway, wherein the atomization zone has a cross-section comprising two dimensions and wherein at least one of the dimensions diverges in a downstream direction along at least a portion of the length of the atomization zone.

41. A nozzle for atomizing a petroleum product comprising:

- A4
- (a) a central passageway for allowing a fluid to be atomized to pass therethrough;

- (b) an outlet comprising an atomization zone and a spray distributor positioned downstream from and in fluid communication with, said central passageway, which spray distributor is configured to promote a predetermined spray pattern;
- (c) a plurality of atomization fluid passageways fluidly communicating with the central passageway via atomization fluid passageway outlets, wherein the atomization fluid passageway outlets have a forward acute angle greater than 60° and are positioned concentrically about a perimeter of the central passageway; and
- (d) a heating zone configured to promote heat exchange between the petroleum feed and the atomization fluid before the petroleum feed and the atomization fluid mix.
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Please add the following claims:

56. The apparatus of claim 15 wherein the plurality of sparger fluid passageways are configured to promote radial flow, axial flow, or a combination thereof, said flow relative to the overall direction of fluid flow through said central passageway.

57. The apparatus of claim 20 wherein the plurality of sparger fluid passageways are configured to promote radial flow, axial flow, or a combination thereof, said flow relative to the overall direction of fluid flow through said central passageway.
